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West Europe Report

SCIENCE AND TECHNOLOGY

No. 85

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METHANE PRODUCTION--The "Pasteur Institute," a research center for biochemistry, biotechnology, and gene engineering, which is now held on a majority basis by "Sanofi SA" (Elf-Aquitaine Concern), and "Soc. Lyonnaise des Eaux SA" over the next 3 years want to work together in the area of methane gas production with the help of microorganisms. Lyonnaise and its affiliates "Triga SA" and "Degremont SA" have for years been specializing in waste processing and water purification. [Text] [Duesseldorf EUROPA CHEMIE in German No 28 1981 p 487] 5058

CSO:3102/70

SUBSIDY FOR FLUIDIZED-BED COMBUSTION DEMONSTRATION PROJECT

Amstelveen ENERGIE SPECTRUM in Dutch Nov 81 p 274

[Article: "Subsidy for Industrial Demonstration Project on Fluidized-Bed Combustion"]

[Text] A subsidy in the maximum amount of 1,230,000 guilders has been granted for a demonstration project on the atmospheric fluidized-bed combustion [AFBC] of coal in industry. It involves a project whereby, for the first time in the Netherlands, an AFBC installation is used to produce steam for the use of a commercial product. The AFBC will be installed in the sand-lime brickworks at Koningsbosch (Limburg).

The subsidy will be paid from funds which are available to carry out research development and demonstration programs involving coal. In part 2 of the Memorandum on Energy Policy (the Coal Memorandum) the government provided the impetus for such a project. Next, a program preparation committee produced a proposal for a National Coal Research Program [NOK].

A government position on this proposal will be issued shortly. The preparation committee proposal specified, among other things, that it is necessary to achieve an industrially oriented development program for the accelerated introduction of AFBC boilers. Hence, the demonstration project for which a subsidy has now been granted also fits in the above mentioned proposal.

The demonstration project in the sand-lime brickworks involves an installation with a capacity of 10 tons of steam per hour. Coal consumption amounts to approximately 5,300 tons per year. The project is considered a representative demonstration, both technically and economically, of a small AFBC boiler for the generation of low pressure steam.

The Netherlands Energy Development Company [NEOM] is closely involved in this project; the European Community has promised financial support. The performance of the boiler will be carefully recorded within the framework of a measuring and demonstration program. In this connection, the emphasis will be on the technical-economic and the environmental health aspects. At the same time, attention will be given to the removal of residue. As far as the latter is concerned, the sand-lime brickworks offer eminently good opportunities to incorporate the residue into bricks.

8463
CSO: 3102/50

COAL HYDROGENATION PLANT IN OPERATION

Duesseldorf EUROPA CHEMIE in German No 28, 1981, p 487

[Text] Following the construction of a demonstration plant for the high-pressure gasification of coal by the Saarbergwerke outfit and the "Dr Otto & Comp. GmbH," now a pilot plant for coal liquefaction connected with the Saarberg-BP [Benzin- und Petroleum AG/ subsidiary "Association for Coal Liquifaction, mbH" has begun hydrogenation operations. With this plant--which allows one to optimize the processes involved--experience is to be gained for constructing and designing a large plant. Objectives of the testing are, among other things, to decrease the hydrogen consumption, to reduce the process pressure to a maximum of 300 bars, to improve the thermal efficiency, and also to increase adaptability in relation to the quality of the coal used and the hydrogenation products.

Rudolf Lenhartz, chairman of the Saarbergwerke managing board, made it clear that regardless of the economic efficiency of the process--relative to German conditions--this technology will continue to have need of assistance from the State. In his opinion, a stop-and-go policy is not congenial to hydrogenation technology. According to Lenhartz, one cannot "mothball" an intermediate stage of this technology and get back into development without any interruption when the basic conditions are more favorable. The component of experience needed with this technology is simply too great to do this, he said.

And so the demand for government aid in the construction of a large plant is a necessary consequence of this train of thought. It is understandable that the above outfit would prefer to have the large plant located in the Saar area, in view of its financial and technical commitment, especially since it can point to both process-engineering and site-related advantages. But even a bidder from the Ruhr surely does not have fewer advantages to show for the construction of this sort of large plant in the Ruhr district. In view of the low ebb in the budget finances of the research minister, it is unlikely that anything but a large plant will be able to secure any public assistance, in which case it may be built on the North Sea coast of Lower Saxony--because of the potential for using cheap imported coal.

12114
CSO: 3102/61

BRIEFS

SYNTHETIC FUEL PLANT--An energy plant for the generation of synthetic motor fuel in quantities sufficient to meet about 10 percent of Sweden's gasoline requirements, is to be built in Nynaeshamn, 55 kilometers southeast of Stockholm. For this purpose, the electric concern ASEA, AB Nyneas Petroleum (member of the Axel Johnson Group), and Storstockholms Energi AB (STOSEB, supply enterprise for energy deliveries in the Great Stockholm area) will form a consortium to plan and build the plant. The production effort can be based on coal and heavy oil residues. They will be converted into heating gas and synthetic fuel (methanol or synthetic gasoline) by means of a coal gasification process and chemical synthesis. The low-grade waste heat developing during this process is recovered and supplies hot water for district heating in the Stockholm area. In this way it will be possible to reduce Swedish crude oil imports by 1 million tons per year. An even greater reduction in oil requirements can be achieved by lowering the temperature of the return water by means of heat pumps before that water is pumped back to Nynaeshamn. If the heat pumps are also used to recover heat from other low-grade waste heat sources, then it will be possible to save as much as 70 percent of the oil consumed in Stockholm today for heating purposes. The emissions of the energy plant would be extremely small, compared to those coming from conventional plants, running on coal or oil, for the generation of heating gas and hot water. The sulfur dioxide emissions can be reduced by 10,000 tons per year. The energy supply plant in Nynaeshamn is scheduled to go into operation in 1987-1988. [Text] [Bern TECHNISCHE RUNDSCHAU in German 20 Oct 81 p 11] 5058

FUNDS FOR BIOMASS ALCOHOL--The results of the research and development projects pertaining to the extraction of ethanol from biomass are so encouraging in terms of the technology involved, energy balance, and profitability that a decision may be made even in the near future concerning the construction of commercial-scale test plants. This was stressed by the parliamentary state secretary in the federal research ministry, Erwin Stahl, in answer to corresponding questions from the Bundestag. According to Stahl, the operating results of such plants will give information about the limiting economic conditions under which an ethanol extraction from biomass will be possible on a larger scale in the FRG. For its part, the federal food ministry wants to give assistance totaling DM 2.4 million for the construction and operation of a demonstration plant for the extraction of ethanol from residual substances of sugar production and from beet juice. At the same time, the federal research minister wants to support the development of new biotechnological procedures for the digestion

and fermentation of various initial products of vegetable origin, as well as the search for and genetic optimization of new, powerful strains of micro-organisms for the extraction of ethanol. Up to now, about DM 4 million of development funds have been allocated for this purpose. Moreover, the development and commercial-scale testing of general processes for ethanol extraction have received assistance within the framework of the raw-material research program. To this end, funds amounting to DM 7 million have been promised. [Text] [Duesseldorf EUROPA CHEMIE in German No 28, 1981 p 487] 12114

AID FOR COAL CONVERSION--Frankfurt, 8 November. The 1982 budget of the federal ministries of economy and of research and technology allocates a total of DM 293.3 million for coal refining activities. The Economic Ministry is to confine itself to the support of large-scale technical coal refining plants while the Research Ministry will help finance research and development up to the prototype plant. The Economic Ministry's budget includes DM 50 million for large-scale industrial coal refining plants plus DM 950 million for obligation authorizations. The use of these obligation authorizations however requires the approval of the budget committee. The following areas will be supported in 1982 for coal research through the Research Ministry according to the ideas of the research minister (in millions of DM):

Gas generation from coal	12.0
Coal liquefaction	10.0
Electric power generation from coal	15.0
Coke production and direct combustion	4.0
Deposit exploration	5.0
Digging and mining systems	7.2
Processing	0.1
Gas generation from coal	119.0
Coal liquefaction	121.0

[Text] [Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 9 Nov 81 p 7] 5058

CSO:3102/71

REPORT ON USE OF CNC MACHINE TOOLS IN FRG

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 2 Nov 81 p 7

[Unattributed article: "CNC Machine Tools Lower Costs. In the FRG There Are About 25,000 Numeric Machine Tools"]

[Text] After initially slow acceptance NC [numerically controlled] machine tools in the FRG have been rapidly becoming established since the mid-1970's: it was determined that for mid-1980 there was an inventory of about 25,000 units, and in 1980 alone about 4,000 to 5,000 new installations. This information comes from the Frauenhof Institute for Systems Technology and Innovative Research, Karlsruhe. The technical development was marked by the transition from conventional (wired) NC systems to stored-program CNC [computer numeric controlled] systems. These CNC systems, in contrast to conventional NC systems, have the following advantages: declining costs of acquisition for controls, expansion of possible uses, higher flexibility and quality improvement, and more intensive uses. In addition to these economic advantages, in the work organization the CNC systems open up opportunities for qualitative improvement of work places where program optimizing and debugging and programming itself are transferred to the operator.

The study which has now been produced concerning the "economic and social effects of the use of CNC machine tools" is based primarily on written questioning of user companies and on numerous case studies. The CNC machine tools are primarily in use in the FRG in the following branches: machine building (47 percent), vehicle building (13 percent) and the electrical industry (9 percent). They are being increasingly used in single-part production and in large series production (in 1980: 10 percent in single-part production, 50 percent in small series manufacture and 40 percent for larger series).

In the case of the kinds of use related to the work organization, programming in operations scheduling clearly dominates in contrast to machine shop programming (78 to 22 percent). Fifty percent of the skilled workers work as machine operators on CNC machine tools which have been recoreded on the basis of broad surveys; in this connection the share in machine shop programming at about 80 percent is almost twice as large as in programming operations scheduling. In 1980 about 20,000 machine operators worked at the approximately 12,000 CNC machine tools in the FRG. As a result of the rapid spread, about 7,000 additional CNC machines operators are required annually.

The Institute observed that on the other hand, each year, on the basis of mathematical figuring alone, some 9,000 operators are freed from conventional machine tools. But only in part does this have an effect since the personnel savings are often compensated for by corresponding increases in capacity. Increasing the degree of automation and machine performance will result on the average in a 40-percent reduction in manufacturing time. In addition, it was possible to achieve a reduction in costs for control, reworking and rejects, but machine costs are 30 to 60 percent higher. Overall, the case studies revealed that manufacturing costs could be reduced up to 40 percent. Personnel savings on the average were 50 percent.

The economy of CNC machine tools is judged very favorably by the users, it often exceeds the values determined in figuring the investment. In this connection, the decision on various possibilities for organizing work in the enterprises is still extensively done without detailed comparisons of economical operation. The advantages and disadvantages of CNC-specific machine shop programming are of course in part a subject of controversial discussion in the enterprises, but there is no quantitative comparison of the relevant magnitudes of costs and benefit because of the lack of values based on experience. Thus, additional practical experiences and improved cost-use analyses are necessary in order to be able to define efficient ranges of use for the various kinds of machine shop programming.

12124
CSO: 3102/48

METAL-ACTIVE-GAS WELDING ECONOMICAL, EFFICIENT

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 4 Nov 81 p 5

[Article: "Mixed Gases Prevail in Metal-Active-Gas (MAG) Welding. A Serious Alternative to Rod-Electrode Welding. Actual Examples From Practice"]

[Text] In contrast to other welding processes there has been a steadily increasing trend toward using shielded-arc welding. In respect to manufacturing and repair welding, all welding processes are wage-cost intensive. In the rationalization and use, respectively, of economical welding methods there is the possibility, given the high wage-cost level, of guaranteeing the competitiveness of a manufacturing plant and of retaining jobs. In particular, mention should be made of the MAG-M welding (=metal-active-gas welding using the mixed gas corgon with a continuously fed wire electrode) as an outstanding shielded-arc welding process. According to data from Linde Ltd, this process is extensively replacing welding with rod electrodes because of its economic and universal uses.

In the application to structural steels the two processes mentioned compete with one another, and it seems certain that for production reasons in many cases the trend will be toward further use of MAG-welding; this is also statistically demonstrable. Typical of the MAG-welding method is, among other things, the fact that with each wire electrode (0.6 to 1.6 mm) a broader deposit range can be used. In comparing maximum deposit efficiencies, the efficiency with MAG is two to three times better, resulting in a correspondingly shorter welding time for welds of the same length with equivalent savings of wage costs. Thus, approximately 50 to 70 percent of the arc burning time is saved for welds of equal length.

The auxiliary process time is also an integral part of the process; this includes cleaning up spatters, cleaning nozzles, nipping wire ends, removing slag, changing electrodes. Here, too, the auxiliary process times vary according to the process. In the case of rod-electrode welding two auxiliary process periods are required for single-pass welds (because slag is removed only once) and up to four periods are needed for multipass welds. The costs of fillers are the third feature which influences costs. If the stub length is short (60 mm) only 600 grams of weld metal are used from 1,000-gram welded rod electrodes. With MAG-M-welding the effective recovery from 1,000 grams is 950 grams if corgon mixed gases are used and 900 grams if carbon dioxide (MAG C) is used.

Because of the differing effective recovery with MAG-welding it is possible to achieve filler savings, on the basis of list prices, of 30 to 40 percent per kg of burned-off weld metal. In the actual example of a disinfector, Linde has demonstrated a savings of about 40 percent for MAG. In the disinfector with 100 m of fillet weld there are about 40 kg of weld metal-disinfector. In experiments done in the companies, about DM80 in filler costs were saved based on the filler cost difference of about DM2 per kg.

In addition to the possibilities for lowering welding costs the following advantages of MAG-welding should be taken into consideration: on the one hand, welding in all welding positions with the same wire electrode, and on the other hand, the capability of bridging gaps with certain fusion at the root; moreover, the possibility of totally mechanical welding with a fixed welding torch in combination with welding devices must be mentioned.

With increasing costs of electric energy, costs take on more importance. As a rule the energy costs with MAG-welding amount to 50 percent as compared to rod-electrode welding (100 percent). Depending on the useful life, the investment in a MAG-welding facility is amortized in one-half to 1 year. MAG-M-welding is therefore an economical alternative to rod-electrode welding because on the average there are 50-percent savings in total costs.

In the case of MAG-welding there is definite evidence of a stronger trend toward mixed gases although mixed gases have a higher cost for the shielding gas. This higher gas price comes from the high share of inert gas (argon) from 80 to 90 percent depending on the kind of corgon mixed gas. In spite of a cost for shielding gas that is more than twice as high (carbon dioxide: DM1.75 per cubic meter and corgon 18: DM3.80 per cubic meter), on the basis of cost studies the cost difference of DM0.32 for shielding gas could be made up for by all the savings in welding time, cleaning time and wire consumption (total costs per part with carbon dioxide: DM14.22, with corgon 18: DM11.52). These cost advantages were demonstrated in further cost analyses, among other things, for transport containers, door hinges on automobiles and gear wheels.

According to information from Messer Griesheim one mixed gas (Krysal) in connection with MAG-welding also provides the opportunity to combine the advantages of the steady argon arc with the properties of an active gas which improve penetration. Particularly in the case of manual MAG-welding it is frequently a matter of bridging gaps, of working in fixed positions. With a universal mixed gas of 82 percent argon and 18 percent carbon dioxide, the carbon dioxide increases the viscosity of the weld metal. The danger of weld defects is reduced. Argon/carbon dioxide mixtures combine the advantages of the two gases: argon gives a steady and spatter-free arc with, of course, fingershaped, mostly unsatisfactory penetration. On the other hand, carbon dioxide causes broader penetation, yet the discharge of spatters is undesirable as an economic factor.

It was ascertained that adding 18 percent carbon dioxide produces a balanced proportion between the advantages and disadvantages of both gases; even though not spatterfree, the droplet transfer is at least low in spatters. At the same time sure penetration is achieved in the process. Whether in crane building, or boilermaking or in making various kinds of equipment--there are numerous

enterprises which currently do welding jobs with this mixed gas which require licensing. Even the bridge building department of the FRG railroad has confirmed that it meets the safety requirements for structures subject to dynamic stress. With rust- and acid-resistant steels, which are subject to corrosive stress, one should, however, be careful with mixed gases. The proportion of carbon dioxide in the shielding gas should never exceed 5 percent.

The danger of carburization and the associated formation of chrome carbide, and thus chrome depletion, must not be ignored. The situation is different with austenites which are intended for coating. The austenitic wire electrode with 18 percent Cr, 8 percent Ni and 6 percent Mn can be welded in an excellent manner with this mixed gas. Resistance to chemical reactions is not a requirement, but toughness and resistance to wear are. A possible increase in the proportion of carbon in the weld metal is in this case a likely advantage. In respect to the primary areas of use it should be noted: this mixed gas is applicable in almost all situations, whether they be heavy construction parts with seams in gravity position, welding in fixed position such as railcar building. The mechanical property data are excellent in the case of welds on high strength structural steels.

According to Messer Griesheim, corgon, too, like this mixed gas, is universally usable as an individual shielding gas for MAG-welding; with 90 percent argon and 5 percent each oxygen and carbon dioxide it is also well suited for thin-walled components because of the surface-stressed heat emission. The active components, oxygen and carbon dioxide, give specific and varying characteristics to the processes in the arc and thus the material transfer. Carbon dioxide primarily influences the shape of penetration, oxygen promotes the presence of fine drops.

Mixed gases with 92 percent argon and 8 percent oxygen and 88 percent argon and 12 percent oxygen (argomix), respectively, are available as fast shielding gases for MAG-welding. Argon provides a smooth, steadily burning arc. When welding steel, however, the material transfer is in coarse drops. The shape of penetration is not satisfactory in the case of joint welding; oxygen takes care of that. It relaxes the drop surface and thus produces a fine-drop fusing of the wire electrode and with additional combustion heat it provides broader and deeper penetration. And the boiling points of oxygen and argon are very close, thus the result is a stable mixture, even when not in the liquid state. The addition of oxygen improves the transfer of heat from the arc to the component. The result is good coalescence, rapid welding feed, high performance, thus well suited for mechanized and automatic welding, primarily in large-scale series manufacturing.

12124
CSO: 3102/48

SUPPORT FOR DEVELOPMENT OF ADVANCED HANDLING SYSTEMS

Duesseldorf VDI-Z in German No 19, Oct 81 p VIII

[Text] For about 2 years now, the Federal Ministry for Research and Technology has been supporting research and development projects within the framework of the Manufacturing-technology Program. The aim of this has been to strengthen competitiveness in key areas of the capital-goods industry and to increase the productivity of small-scale organizational structures in technology-intensive areas of the outfitting industry. The target group for this involves above all equippers which design and manufacture equipment and systems for industrial production, and in addition those equipment users which perform selected pilot trials and those research institutions which are working on industrial developments. This support is concentrating on projects where new ground is being broken in technology and science, substantial steps are being taken on improving equipment and procedures, and where the associated economic risks are too great to warrant private development. As a rule, the allocations to firms amount to 50 percent of the expenditures which they can assign to the project.

Examples of the sorts of problems posed in such research and development projects are (as extracted from the Manufacturing-technology Program of the Federal Government):

- Development of new, efficient industrial robots as a modular unit architectural system and for special applications,

- machine-integrated handling systems,

- further development of sensors for industrial robots,

- development of sensor-guided, modularly constructed handling devices with teachable controls,

- further development and industry-wide standardization of gripping systems,

- development of versatile ordering and storage equipment,

- working out of standardized general solutions for problems involving handling,

- further development of safety equipment for industrial robots.

Also belonging to this field of activities are software tools for the programming, operation, maintenance, and assessment of the devices. Extensive developmental results will be likely to be achieved in the future in the domain of automatic assembling. Thus programmable assembling and feeding systems represent another point of main effort in this project-assistance program.

Those who are interested in the Manufacturing-technology Program should contact the responsible project executor under the heading "handling systems": Karlsruhe Nuclear Research Center GmbH, Project Sponsorship for Manufacturing Technology (PFT), attention of H. J. Wolter, Post Office Box 36 40, 7500 Karlsruhe 1. One can also request at this address the forms for project proposals which will have an effective term from 1 January 1982 on.

12114
CSO: 3102/62

COMPLETELY AUTOMATED PEUGEOT FACILITY PLANNED FOR 1983

Stockholm NY TEKNIK in Swedish 8 Oct 81 p 25

[Article by Goran Lundstrom]

> [Text] The manufacture of engine blocks, cylinder heads and transmission parts will be completely automated in a plant which Peugeot and Citroen will inaugurate in France on 9 June 1983. It will be the most advanced plant of its kind in Europe. The facility is an experimental plant which will limit its production to prototype engines.

The French venture in the areas of industrial robots and advanced manufacturing technology has now got properly started after much research at the state level.

This is how the automatic machining will take place:

The pieces to be machined, which must be maximum 500 X 500 X 500 millimeters, are loaded at two stations on rail waggons, the so-called pallets. Throughout the working process, they remain fastened on these pallets.

Signalling Problem

After the drilling station, an industrial robot blows all apertures clean. The machining time per part varies between 40 and 70 minutes. The operation of the entire system will take place from a general computer. The numerically-controlled machinery, which was ordered recently, has its own controls which take over when their respective work tables have been provided with a pallet.

Among the problems which remain to be solved is the signalling of, for example, damage to tools. In the case of the larger manufacturing tools, this is normally less difficult since the breakdown of a tool will cause a major change in the power needs of the propelling engine, a change which may be used as a stoppage or warning signal. Where small tools break down, the corresponding signal will be much too weak, and other methods of detection will have to be found.

Most Advanced

The software for the system has been developed and was recently simulation run with a good result. When the plant is ready, it will be one of the most advanced plants in Europe. There are several similarities between the project of Citroen and a project which was recently started at the Royal Institute of Technology under the auspices of the Institute for Engineering Research.

7262
CSO: 3102/73

BRIEFS

PLASMA STEEL TECHNOLOGY--5 Nov--The Journal of Metals No 9/1981 reported that in February of this year the first construction stage of an iron-sponge production plant, which operates on the basis of a plasma technology developed by SKF [Swedish Ballbearing Works] Steel, was put into operation in the Swedish Hofors area. The iron sponge produced is an important base material for the generation of high-grade steels. The production results obtained so far suggest that the functioning of these plasma generators has exceeded all expectations. It is said that very stable operating conditions have been achieved for the Plasmared plant, and the lifetime of 200 hours calculated for the electrodes supposedly has been greatly exceeded in certain cases, with up to more than 400 hours having been achieved. Moreover, the test running has shown that the energy consumption can be held within the calculated limits. For the production of a ton of iron sponge with a metal content of 90 percent, an average of 8.8 gigajoules of electrical energy were consumed. [Text] [Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 6 Nov 81 p 7] 12114

FRENCH CARBON FIBER INDUSTRY--In France, great efforts are at present being made to increase the research and manufacturing resources in respect of materials based on carbon fiber. A special body was recently set up to coordinate the activities of the different ministries with regard to composite material. The first task will be to map out the development phases within the different enterprises in order, subsequently, with financial support to facilitate the coordination of these efforts in respect of the preferred composite material. Among enterprises active within the area may be mentioned SNIAS, Dassault, SEP and Elf-Aquitaine. Several of these enterprises are located in the south-western part of France where a kind of French California for composite material is being built. Elf-Aquitaine announced recently that it will start its production of carbon fiber. In order to gain access to fully developed technology, a contract was concluded with SEP, which has already delivered composite material for aircraft and space applications. The cooperation will comprise joint research, manufacture, and marketing of all types of carbon fiber, composites and their components (carbon fiber and resins). Efforts will be made to find new areas of application, for example within the oil industry and the automobile industry. Both SEP and Elf Aquitaine have previously concluded contracts with foreign enterprises specializing in carbon fiber, resins and various types of composite material. SEP is,moreover, in negotiations with an American enterprise in order to start production of ceramic composite material where a venture is planned with state support. [Text] [Helsingborg PLASTFORUM SCANDINAVIA in Swedish No 10, 1981 p 16] 7262

CSO: 3102/73

SCIENCE POLICY

NETHERLANDS BUDGETS MORE FUNDS FOR S & T IN 1982

Amstelveen ENERGIE SPECTRUM in Dutch Nov 81 pp 274-275

[Article: "Science Budget for 1982 Includes More Funds for Science and Technology"]

> [Text] During the eighties it will be necessary to work in various ways on the further mobilization of science and technology to the benefit of society. In this regard, a number of aspects are significant: financing, infrastructure, the conditions under which the research is to take place, and -- in relation to both of the previous points -- the social impact of the research.

It appears from the 1982 science budget that the total research effort in the Netherlands in 1982 will involve an expenditure level of approximately 7 billion guilders. Of this, the government itself will assume 3.5 billion guilders, a little less than half. Nearly 1.5 billion guilders of this will be spent by universities and colleges. Expenditures for research and development in industry are estimated at approximately 3.6 billion guilders.

Following an original decline in the years prior to 1978, the share of research in the GNP in the Netherlands has remained about the same since that year (1.9 percent). This applies both to the research financed by industry and the funds made available by the government. In terms of volume development it is also possible to talk of a stabilization since 1978.

In fact, it is even possible to talk of a certain volume increase for 1982: nearly 41 million extra guilders will be made available for space travel; expenditures for the so-called large and small development credits will go up by 40 million guilders; and the funds for energy research in greenhouse horticulture will go up by 7 million guilders. Compensation for these amounts was found elsewhere in the national budget.

These global statements on expenditures for research and development work could, in the opinion of the government, cover up rather divergent developments of the different cost components. For example, when industry refers to a modest increase in the volume of personnel expenditures, the material operating expenditures provide a much less favorable picture. This is caused by the strong increase in costs, among other things for equipment and energy.

As far as government financed research is concerned, it must even be noted that the level of assistance is becoming increasingly less adequate. The only possible conclusion is that a growing disproportion between personnel and material expenditures will be at the cost of research results. The government has deduced from the above that the volume of research efforts should remain at least the same, so that research can contribute to a strengthening of the economic base and further so that it can also properly be of service to society.

Infrastructure

With regard to infrastructure, the minister of education and science wrote that the government must guarantee a sufficiently large and highly qualified corps of researchers. There may be problems here in the near future. It has been noted that the turnover among the permanent researchers is too small. The government will shortly determine its position on the report on the problem of mobility published earlier this year by the Starting Group on Strategic Evaluation TNO [Netherlands Central Organization for Applied Natural Scientific Research].

The social impact of research will be promoted by a number of policy instruments, such as sector councils, programming bodies, transfer of knowledge, research programs oriented toward innovation, and also by means of improved financial policy machinery.

Direction of Research

During the next few years, the increased use of science and technology will have to be directed primarily toward four main areas: economic-technological development, material resources, man and environment, and society. In addition, a strong policy for basic research will be necessary in order to provide a sound basis for the application of science and the introduction of new technologies.

Economic Structure

The structure of the Dutch economy is currently experiencing a necessary adjustment, whereby the strategic policy puts greater emphasis on an information intensive production package with high quality end products. This means a strengthening and stimulation of the following areas:

- micro-electronics and related fields;
- manufacturing and design techniques, such as the use of robots and computer aided design;
- information technology, hardware as well as software;
- telecommunication and remote sensing;
- maritime and offshore technology;
- biotechnology;
- industrial organization and industrial management.

The supply of raw materials and the supply of energy are also important for the changing economic policy. Energy research in the eighties will be primarily directed toward conservation and toward sources of energy different from those used today. Research in the area of raw materials and equipment is very significant for innovative developments in industry. It will be primarily directed toward replacement materials and toward the recycling and processing of (waste) materials. In

addition, it is necessary in more general terms, to promote the science of materials, also in the basic sense of the word.

As far as environmental policy is concerned, it has been noted that its close intertwining with energy research and with industrial technology is increasingly visible and only makes the problems more complex. Environmental and nature research are still too fragmented. It will be necessary to look for a long term approach in which a great deal of attention is given to the prevention of environmental pollution.

Industrial Technology

An estimated 4.5 billion guilders will be spent in the Netherlands in 1982 for industrial-technological research. The government will assume approximately one-third of this amount, and the remaining expenditures will have to be carried by industry. In 1979, the total amount was still 4 billion guilders; in 1977 it was 3.6 billion guilders.

Thus, according to the 1982 science budget, a rather clear growth of expenditures for technological research is involved; this growth is even "significant" after 1979. The number of people in industry who are active in research and development work, specifically in the metal engineering industry and in the chemical industry, has also gone up since 1978, following yearly decreases during the previous years. Industry's interest in research activities is also evidenced by an increase of expenditures for investments in buildings, land, machines and equipment.

Government expenditures for industrial-technological research are divisible into basic research, which in recent years has shown a slight tendency to decrease, and applied research. In the latter category, expenditures since 1978 have clearly increased, an increase which must be attributed to the innovative policy of the Ministries of Science and of Economic Affairs.

Energy Research

In the near future, the "new scarcities" of energy, raw materials and environmental goods will be important determining marginal conditions for the socio-economic development of the industrialized world. Hence, the energy policy will increasingly be determined less by the economic policy. Energy research will have to have an impact on this. Next year, at the initiative of the minister of science, studies will be undertaken on the effects of this new scarcity on the socio-economic development of the Netherlands in the medium term. Policy studies concerning demand will also be undertaken to determine whether a reduction of the energy intensiveness of the economy through efficiency improvement and the introduction of new processes and products will lead to an improvement of the Dutch economic situation.

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TECHNICAL DETAILS ON NEW FRENCH HIGH-SPEED TRAIN

Essen ELEKTRO-ANZEIGER in German No 19, 1981 pp 8, 10

[Unattributed article: "Jets Getting Competition"]

> [Text] At least on the Paris--Lyon run, a rail connection has since 22 September 1981 been so fast that one can speak of competition for modern jets which must be taken seriously.

With enormous investments--there is talk of more than DM 4 billion for research, development, and construction--the French State Railroads have established a rail transportation system (TGV [Very High-Speed Train]) which for the time being has no equal in Europe. With speeds of up to 260 km/hr (the record, established in the spring of 1981, is 380 km/hr), the travel time from Paris to Geneva is reduced from 5 1/2 hours to 3 hours and 19 minutes. Even the well-known Japanese express trains on the Shinkansen line are still rather slow with a speed of 210 km/hr compared to the TGV (Tres Grande Vitesse or very high speed, in English).

The French State Railroads do not only want to win motorists and air travelers over to rail travel but with the TGV they expect to consume about 100,000 t of oil per year less in France. The TGV network is to be expanded to Marseille and Montpellier and, via branch lines, it is to service the most important cities in the southeastern part of France as well as Geneva and Lausanne in Switzerland.

Less Energy

The per-passenger energy requirement in the TGV, compared to the automobile, is one-half and compared to the passenger aircraft one-fifth, it says in a cost study prepared by representatives of the French Transportation Ministry, the Transportation Research Institute, the SNCF [French State Railroads], and industry together for the French Rapid Transportation Club. During its first year of operations, this new train connection will yield a time saving totalling 18 million hours for travelers who already take the train on this route. Moreover, the trains can run also during bad or winter weather, something which is not always possible in the case of the automobile or the airplane.

The French State Railroads expect an annual 17 million passengers during the initial phase; by 1985, the figure is to be 22 million.

And all of them will travel comfortably and safely. The cars are tastefully appointed; they are air conditioned and they have comfortable cushion seats in the first and second classes. Meals are served at the seat. "The train noise in the interior of the car, at full speed, does not even attain the sound intensity of normal conversation," said a SNCF spokesman. With its quiet running, the TGV is superior to most conventional trains.

Less Weight

Comfort, speed, reliable operation, and economical energy consumption in the TGV are connected with technical innovations which are the result of more than 25 years of French express train research. It is especially the light-weight construction and the excellent rail placement of the TGV which, in express travel, contribute to lower energy and line maintenance costs.

The maximum axle loads are only 17 t, as against 21 t in the hitherto fastest SNCF motor coaches. And because the TGV while in operation is more than 20 cm lower above the tracks than a conventional train, the air resistance is also reduced.

The lesser weight and the lower profile were achieved by means of several technical refinements. That includes the train's articulated design, a novel truck design with improved power transmission system, and the use of Du Pont polyimide foil called "Kapton" as insulating material in the drive motors.

The TGV consists of eight passenger cars and one, each, engine at the head and the end of the train. Each engine rests on two motorized trucks and provides a third motorized truck under the connecting car with energy. The ends of two neighboring passenger cars, each, which face each other, are on one and the same truck.

With the help of this principle, the ten-part TGV train does not have the usual 20 trucks but only 13. This means that the weight of seven trucks can be eliminated. The design in the form of the articulated power train with common trucks for neighboring passenger cars is also the key to the energy-saving aerodynamic properties of the TGV. Here, the vehicle bottom is only 1.02 m above the rails, contrary to the hitherto lowest French individual car with 1.25 m. Additional important aerodynamic features of the TGV are the streamlined shape of the forward and rear train parts, the directly meeting passenger cars, the particular curvature of the side walls and the reduction of any protrusions on the roof, under the car body, and on the sides.

The common trucks also increase the riding comfort. Because they are at the ends of the cars, no part of the passenger compartments is directly over the wheels.

The new powered truck type used in the TGV weighs 2 t less than a conventional motorized truck. This is achieved by not attaching the traction motors to the trucks but by suspending them under the car bottom. Power transmission to the drive axles is accomplished via a rubber-joint drive shaft which absorbs all vertical, transversal, rotating, or oscillating movements of the vehicle that are caused by the trucks.

The engine insulation equipment, developed by Alsthom-Atlantique, the leading company in the group of enterprises participating in the development and production of the TGV, also helps save weight. On the basis of experience with this material in its other high-performance traction engines, the company selected "Kapton" polyimide foil by Du Pont for the insulation of the armature and stator coils.

Bernard Jouy, chief engineer for rotation machines in the company's drive motor study group, explained: "The excellent dielectric properties of 'Kapton' at high temperatures makes it possible to keep the insulations much thinner and to arrange the conductors closely next to each other to a much greater extent than when we use other insulating materials in class H.

"Compared to conventionally insulated engines of the same capacity, we were able to reduce the armature coil length by 7 percent and the engine weight by 5 percent in our new TAB-676 motor for the TGV. Experience tells us that 'Kapton'--in spite of its higher price when compared to conventional insulating materials--facilitates a reduction in the general production costs by 3 percent."

It was furthermore found that the reeling technique provides additional protection against so-called pin-hole formation and makes for a more uniform thickness of the insulating layer especially along the edges and corners of conductors with rectangular cross-section.

In the TGV engines, the individual conductors are insulated with "Kapton" F, a polyimide foil which, for hot-sealing is coated with "Teflon" FEP fluoride plastic, likewise by Du Pont. Thereafter, the conductor bundles are wound with mica glass-fiber tape and uncoated "Kapton" H. The aramide paper "Nomex"--likewise developed by Du Pont--is used as intermediate layer. In conclusion, the finished armature coil is vacuum-impregnated with solvent-free silicon, in accordance with the requirements for drive motors in the H insulation class. The permissible coil temperature is 200° C for the armature and 220° C for the stator--something which is rather unusual for drive motors.

The TGV motors are designed for particularly severe stress. On a rail line segment, for example, the TGV must negotiate a slope of 35‰ where by the engines work at 1,000 a for 7 minutes.

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GASOLINE/METHANOL ENGINE TO BE TESTED FOR PRODUCTION

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 4 Nov 81 p 5

/Text/ The Dutch Ministry of Economics is supporting the development of automobile engines which can be operated both on gasoline and on alcohol or on a gasoline-alcohol mixture. The Institute for Applied Scientific Research (TNO) in Delft was given 850,000 Dutch guilders for this purpose.

The Institute has built one engine of this type which is quite small and can be installed in almost all automobiles. According to information from the TNO, for the present 30 cars will be equipped with it for test purposes, including 15 Volvo 340 cars manufactured in the Netherlands. The TNO wants to gain experience with the engine over a period of 2 years. Following that it should be able to be mass-produced and sold at an acceptable price. In the opinion of J. van der Weide, under whose direction the engine was developed, the system does not, of course, offer a solution to the petroleum problem. However, it is eminently suitable for a transition period. Van der Weide said that a car which can drive on alcohol alone is much more economical and performs better than any other. Of course, then it will have to be equipped with a special engine; automobile manufacturers are currently occupied with the production of such an engine.

Any kind of alcohol and gasoline mixture can be poured into the tanks of the vehicles equipped with the TNO engine. The equipment senses the amount of alcohol in the fuel mixture and adjusts it in each case to the carburetor. However, the system is not suitable for diesel engines. According to TNO data the alcohol-gasoline mixture has the same performance capability as gasoline alone. However, fuel consumption is higher, in fact 1.8 to 1.9 liters of alcohol are required in order to achieve the same performance as 1 liter of gasoline. Since alcohol is much more economical than gasoline, this should not have any great influence on overall fuel costs.

Between the two kinds of alcohol, methanol and ethanol, TNO has decided in favor of the former. Of course, ethanol would be much more efficient and better for the engine, however, its production costs are nearly three times as high as those for methanol. TNO is convinced that the Netherlands have sufficient primary materials in order for the country's entire fleet of cars to use methanol. This fuel can be produced from natural gas, hard coal or brown coal. Of the 30 million tons of hard coal which the Dutch government wants to use in 2000, 5 million tons would be required in order to let all the automobiles in the Netherlands use pure alcohol for 1 year. If 10 percent methanol is added to the gasoline, then only one to one and one-half million tons of hard coal would be needed. If natural gas is used to produce methanol, than 10 percent of the annual natural gas production would have to be used to operate all automobile engines on pure alcohol, and one-half percent of the natural gas if the fuel mixture in the automobiles consists of 90 percent gasoline and 10 percent alcohol.

STATUS OF 'TRANSRAPID' MAGNETIC LEVITATION PROJECT

Duesseldorf VDI NACHRICHTEN in German 16 Oct 81 p 8

[Article by Walter M. Lehmann: "'Transrapid' Rides into the Next Century"]

> [Text] Magnetic rail line can close supply gap between airplane and railroad. For months now, the concrete bed of the "Transrapid" experimental facility is inching day after day into the flat land, financed by the federal minister of research and technology, between Lingen and Papenburg on the Ems. If the financing keeps step with the construction work so far, the "Transrapid 06" test vehicle will make its first round trip there early in 1983 and thus document Germany's biggest advance in the field of magnetic suspension engineering. Technically, there are hardly any problems now; but financing is causing increasing headaches for the "Transrapid" magnetic rail company consortium and the promoters in Bonn.

At the end of September, a report was delivered to a briefing session on the status of work on the "Transrapid" experimental facility between Lathen and Doerpen in Emsland. The TVE (Transrapid Experimental Facility Emsland) will, after its completion, provide a major intermediate result in the development line which was initiated already in 1969 with the presentation of the first basic model featuring a magnetic suspension and control system and a linear motor. In 1977, the BMFT (Federal Ministry of Research and Technology) decided to promote the development of track-bond rapid transit in a concentrated fashion according to the EMS (electromagnetic suspension) principle. Just 2 years later, at the IVA (International Transportation Exhibit) in Hamburg, a magnetic suspension vehicle was presented to the public with which it was possible to demonstrate the functional effectiveness of the magnetic rail line as a means of transportation for the future.

The organizational prerequisites for the TVE were created, with MBB [Messerschmitt-Boelkow-Blohm] as project manager, through the formation of the Transrapid Magnetic Railroad Consortium, which consists of the following enterprises: AEG (General Electric Company]-Telefunken, BBC [Brown Boveri & Cie.], Dyckerhoff & Widmann, Krauss-Maffei, MBB, Siemens, and Thyssen Industry AG [Incorporated], Henschel, concentrating the technical knowledge gathered by West German industry in the field of magnetic railroad development.

As explained by project director engineer Erich Eitlhuber, the first phase will bring the construction of 20.6 km of single-track bed which is to be extend to 31.5 km. The line layout will in an ideal form correspond to the requirements for a high-speed experimental plant for track-guided vehicles. The flexibility in the line layout and a maximum bank [superelevation] of 12° in spite of small radii in the turn-around loops, facilitate driving at comparatively fast speeds. Two flexible switches of differing design--which can be driven over in the straight section at a maximum speed of 400 km/hr, in the turn-off branch at 200 km/hr or 90 km/hr--are included in the tests.

The experimental line, of whose first phase so far 4.5 km of track have been finished, runs on 5-6 m high supports made of steel concrete while the longitudinal girders are made either of prestressed concrete or steel. The supports have been erected for another 1.5 km. The supports and the longitudinal girders consisting of steel concrete and prestressed concrete are made in a field factory which is in the immediate vicinity of the experimental facility and which is equipped with efficient construction engineering production installations and cranes for loads which weigh 80-160 t. The line is being built at a daily rate of 75 m. So far, 50 km of cable have been laid for the energy supply of the longitudinal stator-linear motor drive.

The framework has also been built at an experimental center. This building will be connected with the experimental line via a switch whose connection segment ends directly in a maintenance shop. There the substation for the energy supply, the control stand with systems for operations control and safety surveillance, installations for the recording and storage of measurement data, as well as rooms for experimental and operating personnel and for visitors,will be located.

The following solutions were originally considered for contactless and no-wear movement: the air cushion principle, the permanent-magnet principle, the electrodynamic (EDS) and the electromagnetic suspension principle (EMS). For technical and economic reasons, only the EDS and the EMS were further pursued in the FRG. This work was promoted by the BMFT--in addition to the great work done by the German enterprises themselves--between 1970 and 1980 with about DM 450 million. The continuation of work on the TVE is not affected by the general fund cutbacks. This involves both the completion of the experimental line and the vehicle.

The "Transrapid 06" experimental vehicle, which consists of two sections and which is now under construction, is designed for a maximum of 196 passengers. Its speed in sustained operation will be 300 km/hr and the top speed will be 400 km/hr.

We cannot expect the implementation of EMS technology beyond the TVE any time soon. The efforts toward European integration among other things presupposed a European transportation system which is characterized by particularly fast speed. Here, the EMS may fill a gap between the aircraft and the railroad which, in addition to the previously mentioned advantages, would also bring independence of petroleum. In this connection it is last but not least nuclear energy for power supply which assumes special significance. Transrapid may be something for an integrated European high-speed transportation network and at the same time it may be a challenge to European policy. To facilitate promising steps in that direction, it would be necessary to present the system developed in the FRG on a scale of 1:1

in practical operation. Lower Saxon lady minister Birgit Breuel pointed to the need for getting the public to understand the development and operation of such a system. In this connection it compared the exemplary French efforts in this field to the difficulties which were created among the public as a result of the planning of a new federal railroad section between Frankfurt and Wuerzburg.

According to the ideas of the TVE consortium, the lessons learned during the initial phase are to be incorporated for the construction of a practical operational line. The thinking here runs toward "connection lines" between several population centers and an airport. It will depend on the results of the work during the coming years and, last but not least, on further promotion whether the leading role of West German industry in this field can be preserved in the future.

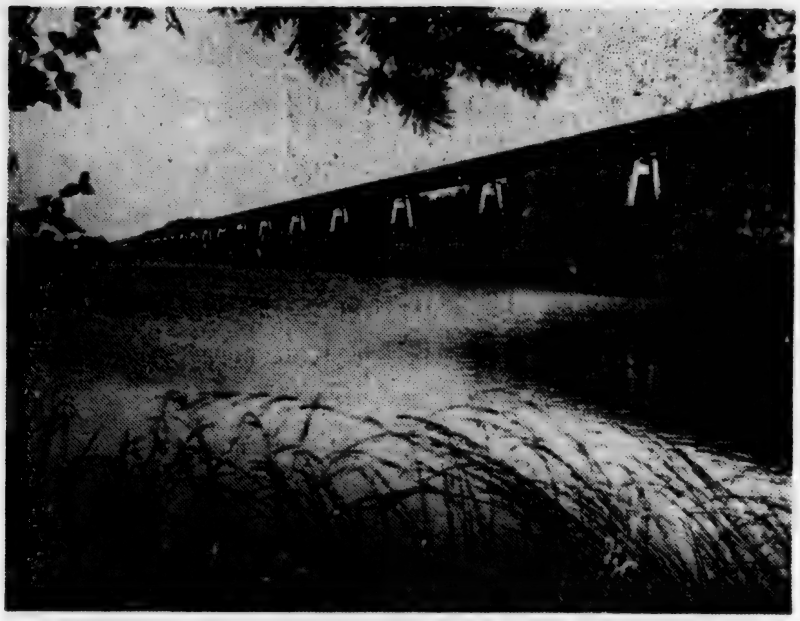
Austrian Railroads "Wired" for 3,000 Kilometers

With the conversion of the 46 km line from Tulln to St. Poelten in Lower Austria, the electrically operated sections of the Austrian Federal Railroads have reached a total length of exactly 3,000 km. In 1945, the network only consisted of about 1,000 km; since then, double that distance has been added.

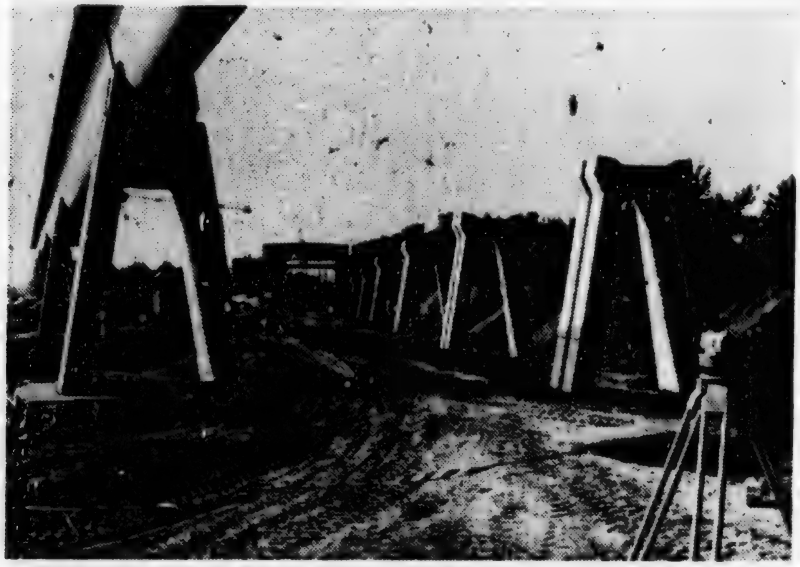
With a share of 51.3 percent of electric lines out of the total network, the Austrian Federal Railroads have reached fourth place among European rail lines and with the approximately 91 percent transportation output resulting from electric power use they even gained second place after Switzerland.

Electrical energy for train tractions comes from the seven railroad-owned power plants, two transformer plants, and five power plants not owned by the railroads with rail line power machines; more than 2,200 km of long-distance lines are used to provide energy to 41 substations where the current is fed into the overhead lines. Last year, about 1,485 Gwh of railroad current were generated with the total installed capacity of 428 Mw. About 90 percent of that come from water power. The in-house supply share of the federal railroads in Austria goes up to 50 percent and is to be retained also in case of further extension of the electrified network.

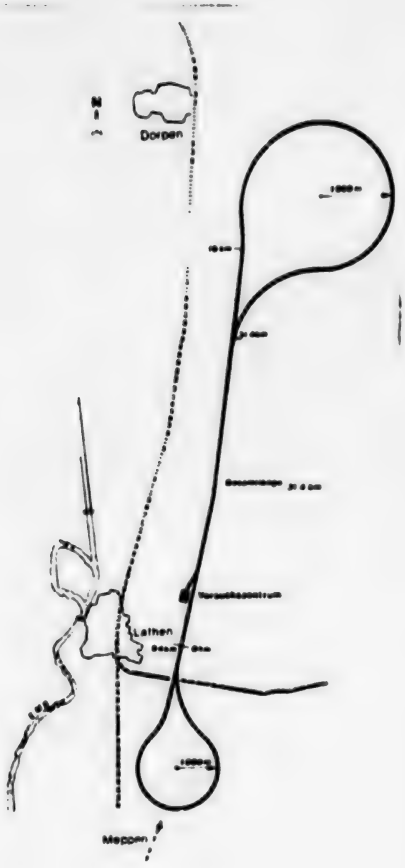
The Fulpmes Power Plant is currently under construction as a replacement for the old Ruez Power Plant; the Annabruecke Power Plant and the Melk Power Plant, with a railroad power machine, on the Danube are also under construction. (rrr)



The magnetic suspension experimental facility runs for a long distance along the Ems branch canal which was begun during the thirties but which was never finished. The line, resting on supports, with a height of 5 m between the supports, is hardly any obstacle to any other transportation routes and agriculture.



From the bed on supports (left) to the experimental center (background) runs a slow-drive siding behind which the bed goes down to level ground (right).



The dimensions of the entire system can be clearly recognized from the line layout of the experimental center at Lathen.

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MATERIALS RESEARCH IN CERAMICS FOR FUTURE GAS TURBINES

Vienna WIENER ZEITUNG in German 12 Nov 81 p 3

/Article by Eugen Hintsches: "Ceramics, as Hard as Iron"/

/Text/ Hairline cracks make brittle ceramic materials tougher and thus more resistant to sudden stresses, for example an impact or heat. This unusual principle was developed by Dr Nils Claussen, engineer, in the powder-metallurgical laboratory of the Max-Planck Institute for Metal Research in Stuttgart (FRG) under the direction of Professor Guenter Petzow. In respect to this unusual result Prof Petzow says: "Thus, we have achieved values for ceramic materials which equal those of today's customary hard metals."

Thus, a goal of materials researchers has come a giant step closer. In numerous laboratories people are at work on developing a gas turbine using ceramic material. This material is not only lighter, more resistant to wear and, because of its common occurrence, substantially cheaper than metals, it also withstands substantially greater heat; a ceramic gas turbine would thus function substantially more economically at higher temperatures and in addition would be better for the environment than traditional drive units made of highly refined metallic substances.

Prof Petzow confirms that "in many areas of use, primarily with temperatures about 1,200°C, it is practically impossible to use metals, ceramics are the only material alternative." Yet to date in spite of that, this material was not able to take hold. According to Dr Claussen this is "due to the genetic defect common to all ceramic materials--brittleness." In a manner different from metals, which under comparable stresses react in a plastic manner, ceramic materials break after only slight deformation, so abruptly that experts speak of a "catastrophic fracture."

However, this system of extremely finely branched microcracks functions as an obstacle that is difficult for a large crack that traverses the ceramic to overcome: as in a maze, the energy of the developing fracture is dissipated in the many hairline cracks, its forces are fanned out in a broad area and thus absorbed so that the tiny cracks open up or widen only slightly: the fracture stops. Large cracks are thus stopped by many small subcritical cracks. Not until this process zone ceases to be able to absorb any more energy does the crack develop further.

The scientists in the powder-metallurgical laboratory of the Max-Planck Institute for Metal Research realized this unusual concept by using a ceramic material consisting of aluminum oxide (Al_2O_3) in which they embed tiny particles of zirconium dioxide (ZrO_2). After mixing, these two powders are hot pressed in graphite molds at 1,500°, a process common in sintering.

While cooling the embedded particles work like tiny explosive charges. The cyrstal lattice of the zirconium dioxide changes at about 1,000° from tetragonal to monocline shape and in so doing expands so strongly that--and this is where the brittleness of ceramics is helpful--the surrounding aluminum oxide can no longer "cope" with the resulting stresses: the desired microcracks develop.

According to studies to date the most efficient crack-collecting system exists when about 15 percent zirconium dioxide is added. The toughness of the material is increased approximately threefold by doing this. A greater amount of zirconium dioxide on the other hand again destroys the effect. The embedded particles are then too close to one another, the subcritical cracks join together into large critical cracks and thus lose their function as an energy absorber. Thus, the toughness and strength of the material are again diminished.

These "bad properties" are now being consciously utilized by the materials researchers at the Max-Planck Institute in order to "correct the inherent shortcomings of ceramics." Precision studies of catastrophic fractures have shown that cracks in ceramic material only very infrequently run in a totally even manner. Rather, the fracture often changes direction because of the nonhomogeneous nature of the material, sometimes it branches at that point. "In other words: the crack loses its energy here, the fracture is thus stopped."

This suggested to the scientists in the powder-metallurgical laboratory the idea of making the work even harder for the fracture in order to take away from it the energy which it uses to continue its course in the material.

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BRIEFS

COMPOSITE MATERIAL SPOILERS--In its Einswarden factory the VFW /United Aeronautical Works/ has started series production of spoilers made of carbon-fiber compound material (CFK) for the wing of the A-310 Airbus. According to orders on hand for the A 310, production comes to over 900 spoilers. The Einswarden factory is producing six spoilers per wing assembly. Aerospatiale in France is building four additional spoilers for the wing assembly. As VFW indicates in this connection, production of components of CFK has been undertaken on this scope for the first time in the German aviation industry. The CFK spoiler manufactured in the Einswarden factory has a surface area of about 1 square meter. It has a spherical shape, thus its body matches the aerodynamic shape of the back of the wing where it is to be installed. A CFK spoiler consists of resin-impregnated, reinforced-plastic honeycombs which are surrounded on all sides by multilayered carbon-fiber reinforced plastic. /Text/ /Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 5 Nov 81 p 7/ 12,124

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